THE IOLA REGISTER.

PUBLISHED EVERY FRIDAY.

CHAS. F. SCOTT.

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W. A. Cowan, City Clerk	$60 00
W. J. Evans, City Treasurer	25 00
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H. I. Brown, Night Watch	420 00
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CAMPBELL & HANKINS, Attorneys. Office one door east of post office, up-stairs, Iola, Kans.

FOUST & SON—Attorneys and Counsellors-at-Law. Office two doors north of Northrup's bank, Iola, Kansas.

S. A. GABB, Lawyer. Office in REGISTER building.

W. R. GLOVER, Attorney at Law, First National Bank building, Humboldt Kansas.

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W. D. SCOTT, M. D.—physician and accoucher. Office first door north Pennsylvania House.

J. E. JEWELL, M. D.—physician and surgeon. Special attention paid to surgery and eye diseases. Moran, Kansas.

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G. A. R.—McCook Post No. 51 meets the first Saturday on or before each full moon at G. A. R. Hall. All comrades in good standing are invited to meet with the Post. J H Vannuys, P C

McCook Relief Corps, No. 145 meets the first and third Saturday afternoons of each month at 2 o'clock in G. A. R. hall.
Gratia McClaren, Sec. Margaret L Miller, Pres.

Salem Chapter No. 4, Order of Eastern Star, meets in Masonic Hall 1st and 3rd Monday in each month. Mrs S A Ellis, W M
Miss Agnes Robinson, Secretary

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Episcopal—Services on third Sunday of the month. Fred E. Stimson, Missionary in charge.

U. B. Church—Preaching every Sunday evening at 7:30 p. m.; Sunday school at 9:45 a. m.; Young Peoples meeting at 6 p. m. All are cordially invited. Rev. King, pastor.

Methodist Episcopal—Corner of Jefferson avenue and Broadway. Services every Sabbath at 11 a. m. and 7:30 p. m. Sunday school at 9:45 a. m. Prayer meeting every Wednesday evening at 7:30. All are cordially invited to all of these meetings. J. Hunter, pastor.

Baptist—On Sycamore street. Preaching Sunday morning and evening. Sunday school at 9:45 a. m. Prayer meeting Wednesday evening at 7:30 p m. Young people's prayer meeting every Sunday evening. M. F. King, pastor.

Reformed—Divine worship in the Christ Reformed church at 11 o'clock a. m. every Sunday. Evening services every two weeks at half past seven o'clock p. m. Sunday school every Sabbath at 10 o'clock a. m. All are cordially invited to attend. L. S. Faust, pastor.

Presbyterian—Madison Ave. Preaching every Sabbath at 11 a. m. and 7:30 p. m. Sabbath school at 9:45 a. m. Prayer meeting Wednesday at 7:30 p. m. Everybody welcome. W. L. Squier pastor.

Second Baptist—Services every second and fourth Sabbath of each month. Preaching at 11 o'clock a. m. and 7:30 p. m. Prayer meeting Wednesday evening. You are welcome.

MISCELLANEOUS.

W. C. T. U.—Regular meeting every second and fourth Friday, at 3 o'clock p. m., at the Presbyterian church.

Allen County Horticultural Society meets every second Friday of each month at 2 o'clock p. m. at G. A. R. hall. J. T. Treadway, Treas. B. F. Pancoast, Secy.

Iola Public Library—Over Northrup's bank. Open every Saturday from 2 to 8 p. m. Stock and membership tickets for sale at the room. Mrs. Wm. Knapp, Librarian.

The Truth About X Rays.

A Correct and Lucid Statement of the Facts About the New Photography.

POPULAR ERRORS CORRECTED.

Gross Exaggerations Are Current, Yet Wonderful Results Have Been Attained—What Scientists Really Think—Theories and Possibilities.

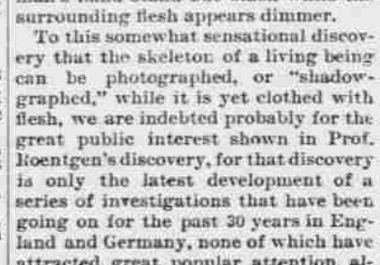
(Copyright 1896.)

PROF. RONTGEN,
Discoverer of the Means of Photographing the Invisible.

The curious form of radiation discovered by Prof. Roentgen, of Wurzburg university, continues to attract much attention, the scientific world being largely occupied with the question: "What is it?" while the general public is more interested in the question: "What will it do?" Reports of experiments by Prof. Roentgen and his followers have made one answer to the latter question familiar—the rays discovered by him will pass through many substances that are opaque to ordinary light, and since they will affect a photographic plate just as light does, shadow pictures of objects enclosed in opaque matter may be made. The word "photograph" applied to these shadow pictures is unfortunate, as by a photograph we usually understand a picture of an object taken by light reflected from that object. No such picture can be taken by the newly discovered radiations. They cannot take, for instance, a full-face picture of a man, though they can throw a shadow of his profile on the sensitive plate. And, since they can traverse flesh more easily than bone, the bones in the shadow-picture of a man's hand stand out black while the surrounding flesh appears dimmer.

To this somewhat sensational discovery that the skeleton of a living being can be photographed, or "shadowgraphed," while it is yet clothed with flesh, we are indebted probably for the great public interest shown in Prof. Roentgen's discovery, for that discovery is only the latest development of a series of investigations that have been going on for the past 30 years in England and Germany, none of which have attracted great popular attention, although they have been eagerly followed and discussed by students.

Ever since the mercury air pump was made so perfect that nearly all the air could be pumped out of a glass bulb, the behavior of the remnant has been noticed and wondered at. It is so peculiar that the air remaining in such high vacua is often said to be in a "fourth state of matter," the other three states of matter being respectively the solid, the liquid and the gaseous. If two metal points be soldered into the bulb so that a rapidly alternating current of electricity can be passed through the gas from an induction coil, we have what is called a "Crookes tube," so named from William Crookes, the distinguished English physicist and chemist, from whose experiments the first clear light on these phenomena was gained. When the exhaustion of the tube is sufficiently high there proceed



ROENTGEN SILHOUETTE.

Photographed by Mr. A. A. C. Swinton through a piece of black vulcanized fiber .0212 inch thick; exposure four minutes.
(Mr. Swinton's own Hand.)

from the negative electric pole (called by physicists the "cathode") faint rays or streamers, which have been named "cathode rays." These move in straight lines and cause many objects on which they are directed to shine with a wonderfully beautiful phosphorescent light. They also exert pressure, as was beautifully shown by Crookes, who constructed one of his tubes with a miniature glass railway within it, on which rolled a little wheel like a windmill. When the cathode rays struck this the wheel rolled rapidly from one end of the tube to the other. The steam could also be shifted about by magnetic attraction. All these discoveries were not so sensational from a popular point of view as the photography of an invisible object, but they were more so to scientists, for at first sight they seemed inexplicable, and they convulsed the scientific world for a long time. Finally most people settled down to acceptance of Crookes' explanation, which considered the "rays" to be streams of air particles (probably actual molecules—the smallest particles obtainable) charged with electricity and shown off from the negative pole or cathode just as a charged pith ball is repelled from an electrical machine. The reason that the phenomenon appeared only in a high vacuum was, according to him, that in air or gas of ordinary density, even the density of the so-called "vacuum" under the bell of an old-fashioned air pump, the molecules are not free to move for sensible distances without striking against one another—their "free path," in other words, was too small. This explanation has been given without comment in most of the orthodox books on physics. But about two years ago, German experimenters threw a bombshell into the English camp by showing that the cathode rays would pass through thin films or sheets of certain metals, and that by inserting an aluminum "window" in the glass tube they could even be made to pass out into ordinary air. Hence, it was argued they could not be streams of molecules, but must be a kind of light, and Lenard, one of the German investigators, pointed out, in additional support of this view, that the rays would produce photographic impressions. If he had followed this up, Roentgen's discovery would have been antedated. As it is, these experiments have again thrown into doubt a matter that was once thought by many to be definitely explained. The English stand by Crookes, the Germans by Lenard, and each side has obtained new experimental evidence that only adds to our perplexity. If the rays are streams of electrified gas, how do they strike through solid objects and take photographs? If they are a kind of light, why do they drive windmills and follow a magnet?

It can now be seen that Roentgen's discovery was only the logical outcome of a long series of previous experiments. To say this is not to belittle him, for this is the usual course of discovery and invention. Roentgen's discovery is that the cathode rays, or that part of them capable of taking photographs, or perhaps a second kind of rays generated by them, will pass not only through an aluminum window, but through the glass sides of the tube itself and through most solid substances, and that they will so pass with different degrees of ease. If they passed through all substances alike, the shadow pictures already referred to could not be taken; it is only because, for instance, the bones are more opaque to them than the flesh that we can make a shadow photograph of the skeleton of the hand.

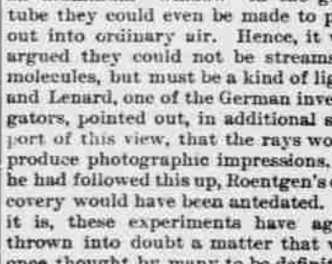


Fig. 1.—Typical Crookes Tube Showing Cathode Rays.—A. Induction coil.—a. Negative pole or Cathode. b. Positive pole c. Rays

The actual discovery was made by accident, and in his original description of it, read at Wurzburg last month, Prof. Roentgen does not dwell particularly on the photographic possibilities. He made the discovery by noticing that a phosphorescent substance near a Crookes tube, over which a cloth had been thrown, gave out a gleam whenever the current was sent through the tube, although the cloth prevented the tube's light from being seen. The discoverer is decidedly of the opinion that the rays which pass the glass walls of the tube are not the cathode rays, but a hitherto unknown kind of rays generated by the cathode rays in the glass itself. Hence he calls them the X rays, since the letter X is used in algebra to designate an unknown quantity. He bases his conclusion largely on the fact that a magnet will not deflect the new rays, while its power over the cathode rays is one of their most peculiar characteristics. Others note the fact that Lenard discovered some time ago that the cathode rays were not simple, but made up of several different kinds of radiation, some of which were deflected by the magnet more easily than others.

Roentgen suggests, in accordance with the general German belief, that the cathode rays are a kind of light, or at least akin to light, that the new rays are vibrations lengthwise in the ether, instead of crosswise, as those of ordinary light are supposed to be. Such vibrations have long been looked for by physicists, and it is natural that any new phenomenon should be ascribed to them. But Roentgen himself admits that there is not yet any positive evidence of his views.

The discovery once made, the experiments were quickly repeated and amplified all over the world, since they require no very delicate manipulation nor costly apparatus. In this country they have been performed with great success by Prof. Wright and Mr. Bumstead at Yale, by Prof. Trowbridge at Harvard, by Prof. Pupin at Columbia, and by Thomas A. Edison.

The possible use of the Roentgen shadow-photography in surgery was suggested in the first reports of the discovery. Prof. Wright has succeeded by its means in locating exactly a large number of shot in the body of a rabbit, and in Montreal a bullet was found in a man's leg by the same means. No one has yet succeeded, however, in photographing any of the internal organs of the body, for the obvious reason that these organs transmit the rays about as well as the surrounding flesh, and hence cast no separate shadow. No very sensational results in this line can be looked for probably, unless the sensitiveness of the process is much increased, and all reports that Mr. Edison, or any one else is prepared to photograph the human brain, with any

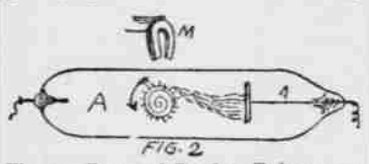


Fig. 2.—Form of Crookes Tube so arranged that the Rays when Deflected by a Magnet, turn a Mill. AA. Electrodes.—B. Windmill.—C. Rays, concentrated by mirror.—M. Magnet.

prospect of success, may be looked upon with suspicion.

One direction in which the invention promises to be particularly useful is in the detection of flaws in metal, as in castings, armor plate, etc. A weld so finely made as to be quite invisible to the naked eye is brought out at once in a shadow-photograph by the Roentgen rays.

The process of making the shadow-photographs, as at present carried out, is of the simplest. The object is placed on the plateholder, and the Crookes tube is suspended close above, thus throwing a shadow of the object through the plateholder, on the plate within. The feat may be performed in broad daylight, since sunlight cannot penetrate the plateholder, while the X rays can.

Shadow photographs have also been made recently by placing the object and the plate between electrodes in open air, without the intervention of the Crookes tubes at all. This, however, is not cathode photography, but the

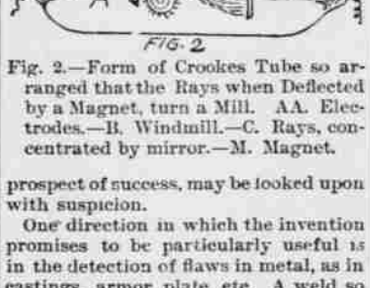


Fig. 3.—Edison's Arrangement for Making Roentgen Shadowgraphs.

development of a form of electro-magnetic photography that has been performed many times within the past two years. More than a year ago a photograph of a coin made in the dark by Prof. Sanford, of Leland Stanford university, by laying it on a photographic plate and subjecting it to a powerful alternating discharge, was reproduced in a large number of technical papers. The sensitive plate in this case is affected by electro magnetic waves proceeding across it. It is possible, however, that there is a real connection between this process and cathode photography, and that when this connection is known the whole mystery of the cathode rays will be cleared up.

It must not be assumed, however, that all processes of photographing by invisible rays are the same. There are many kinds of invisible rays; for instance, those of invisible heat, as from a stove that is not heated to redness. It is now possible to photograph with these last, as well as with the invisible ultra-violent rays of the extreme upper part of the spectrum. The Roentgen discovery, like most widely-noticed discoveries, has been productive of a large amount of sensational predictions and foolish suggestions, many of them the result of a partial knowledge of the subject, although some may perhaps bear fruit in new discoveries. The hope that great practical results will follow in the way of the photography of the interior of solid bodies, as has already

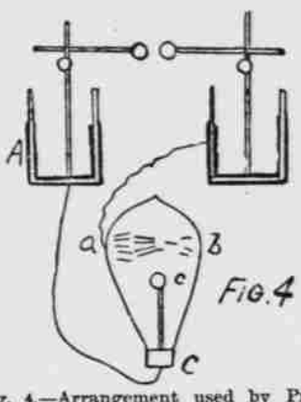


Fig. 4.—Arrangement used by Prof. Pupin, of Columbia.—A. B. Leyden jars.—C. C. Single Electrode of vacuum bulb.—a. Strip of tinfoil on outside.—b. Rays.

been pointed out, seems hardly warranted by anything that has been done so far. The possibility that the rays may have some peculiar effect on the human system has excited interest, but none has yet been discovered, although Thomas A. Edison has announced that he is about to experiment on their properties as germ killers. As is well known, ordinary sunlight is fatal or injurious to the growth of disease germs, and the new rays may possibly be more so. During a recent attempt to photograph a mouse with the rays the animal, which was supposed to be drowned, revived, and this incident was made the most of in a sensational manner, but the experimenter himself said that he believed the rays had nothing to do with the mouse's recovery.

One of the directions in which new discoveries may follow is that of rendering the image or shadow cast by the rays visible to the eye. A process proposed by Mr. Thompson, a New York electrical engineer, is to receive the shadow picture on a surface covered with a fluorescent substance instead of on a photographic plate. Fluorescence would be excited in various degrees, according to the proportion of the rays transmitted by the object, and a shadow picture of it would thus appear corresponding to the shadow photographs already taken. This process has not been developed in detail, but there seems to be no reason why it should not succeed, although the hopes of the inventor, if, as alleged, he expects by its aid to see the human heart beating in the living body, may never be realized. It must be remembered, however, that in a discovery of this kind delicacy of result depends largely on perfection of detail in the process, and the generation that has seen the development of the modern photograph, together with the kinetoscope, the telephone and the phonograph, need not be surprised at anything in this line. Only the skeptics may be pardoned for wishing to see before they fully believe.

DANIEL CLEVERTON.

Too Much Extravagance.

Mrs. Blublud was describing the arrangements for her daughter's wedding.

"After that," she said, "the wedding epithalamium will be—"

"The what?" asked Mr. Blublud.

"The wedding epithalamium."

"I won't pay for it!" he exclaimed, sharply. "You've spent all the money on flowers for that wedding that I can afford."—Chicago Evening Post.

Ready for Her.

Mrs. B. (severely)—Did you mail that postal card I gave you to put in the box this morning?

Mr. B.—No, I didn't.

Mrs. B. (still more severely)—You didn't?

Mr. B.—No, I didn't. I sent your message by telegraph and here's the answer now.—Somerville Journal.

A Careful Mother.

Mother—And you say that this book is totally unfit for my daughter to read?

Bookseller — Most unfit, indeed, madam.

Mother—Well, I'll take it. I'm sure I can keep it where she will never find it.—Puck.

Taking It Literally.

"This morning the doctor ordered me to drink water an hour before every meal, and here I've been drinking for the last 40 minutes; but I'll be jiggered if I can swallow another drop."—Humoristische Blaetter.

News to Him.

Nurse—Willie, in your prayers you forgot to pray for grandmother's safety.

Willie—Has she got a bicycle, too?—Judge.

Had Traveled Before.

Insinuating Stranger—Will anyone meet you at the station?

Farmer Judkins—Yaas, I 'xpec' 'baout two more confidence fellers.—Chicago Record.

Considerate.

Father—Why did you permit young Mashman to kiss you in the parlor last night?

Daughter—Because I was afraid he'd catch cold in the hall.—Brooklyn Life.

Pointer.

Dusty Rhodes—Never ask for dinner at Mrs. Dogood's, except on Sunday.

Fitz William—Why not?

Dusty Rhodes—Any other day she would expect you to work for it.—Puck.

U. S. WEATHER BUREAU.

Some Interesting and Instructive Observations About the Objects it Seeks and the Work it Does.

BY CLARENCE J. NORTON.

PART X.

The climate of the Mississippi valley is strictly continental, being too far inland to be directly affected by the modifying influences of surrounding seas. So, to bring rain into this valley so far from the great primary sources of humidity there must of necessity be a vast deal of expenditure of nature's forces. It is somewhat like working a force pump to draw water from a very deep well; the machinery must be well oiled and in good order. And for that purpose the power of the wind is brought into requisition. The irrigation of this great central basin is mainly affected by wind power; that is, by cyclonic action. Our main dependance is now, always has been, and must always continue to be upon nature's system o cyclones. Even if we should use some of the methods of artificial irrigation to a limited extent, there would still be a necessity of cyclonic movement to draw rainfall to keep up the supply of water in the ground, and ponds to be drawn upon for irrigation purposes. Nature's windmills are usually sufficient for the ample watering of this region without artificial aid. This valley is a great depression in the continent, or a great trough reaching from the Gulf to the Arctic sea, and this great trough is open at both ends, so that the south and north winds have free course up and down. Here is the great battle ground, the scene of many a desperate conflict of the elements. And, as a result of these sharp aerial contests, the earth is drenched not with gore, but with refreshing rain.

Last summer this great inland valley suffered somewhat from a great drought, that was not so severe in Kan. as north of here, that was caused by change of direction of the storm centres at the times when the drought was most severe, the bulk of the "lows" moveing either too far north or south to give us our full quota of rain. The usual amount of humidity was not drawn from the Gulf, or the humid winds were deflected and their moisture precipitated in other sections. Kansas got enough, but Neb. Iowa and Dakotes suffered severly, also Wis. and Minnesota. For 3 days before this drough was broken, a large part of this great interior basin was swept by winds of excesive violence, accompanied by unseasonably high temperature. Clouds of stifling dust filled the air, and the hearts of the people were filled with fear and apprehension of a famine. There was almost a panic in buisness circles. The daily weather map showed an immence low, or cyclone, central west of the Missouri river, reaching from the head of that stream to the Gulf. The isobars, or lines of equal air pressure, were unusually close, making very steep gradients. The weather map of the next day showed six isobaric lines in a distance of 300 miles—denoting a difference of six-tenths of an inch in the murcery of the barometer between these points.

The wind could not help blowing under such conditions any more than water can help flowing rapidly down a steep declivity. It was a windy period long to be remembered. Well, the wind kept on pumping until the power of the suction drew vast volumes of the Gulf vapors into this centre. Then the coling process began, the rains commenced at the Gulf, down in Texas, and gradually extending northward until copious showers gladdened and revived a belt 2,000 miles long and 1,200 miles in width. The measurments of rainfall, as a result of that great cyclone ranged from one and a half to seven inches, the heaviest rains falling west of the Missouri.

So those high winds, frightful and inconvenient though they were, brought beneficence and joy into this region. We must, therefore, breast the storms as they sweep through the valley, taking our chances of being blown into kingdom come by an occasional excess of nature's forces.